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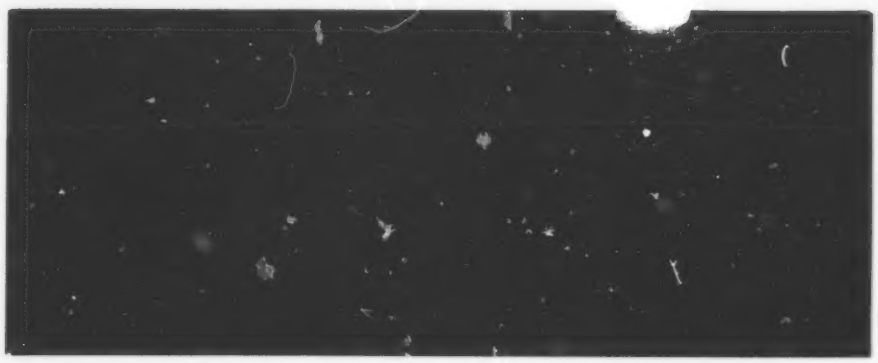

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ERDA PROJECT PROGRESS REPORT 3.1-13

MAY 1989

WESTCO/POOL EAST CENTRAL

SASKATCHEWAN SOIL CONSERVATION STUDY

"SOIL CONSERVATION THROUGH EXTENDED ROTATIONS"

Summary Sheet 1-24-C-3453

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PRODUCT DEVELOPMENT

EAST CENTRAL SASKATCHEWAN CONSERVATION PROJECT

"Soil Conservation Through Extended Rotations"

A reduced frequency of summerfallowing associated with extended rotations could be beneficial in terms of helping to assist and possibly overcome the degree of soil degradation that has taken place. However, in the east central region of Saskatchewan, extended stubble cropping is frequently perceived as being impractical because of the high input costs that are involved. In most cases, the major input cost in recropping is fertilizer. Therefore, if extended recropping programs are to be accepted by more of the farming community, the benefits of effective fertilizer application need to be demonstrated under local conditions. The objective of this study is to help create an awareness of the importance of effective fertilizer application in making extended crop rotations practical and profitable.

This project is a co-operation effort by Westco and Saskatchewan Wheat Pool and has currently completed its third year. The following report will view the results obtained during the 1988 growing season. As the project has been extended into its fourth year a final report, summarizing four years of results, will be prepared upon completion of the 1989 growing season.

Appreciation is extended to the staff of the Saskatchewan Wheat Pool Yorkton Farm Service Centre for the help extended and for the use of their facilities.

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ERDA PROJECT PROGRESS REPORT

Project Title: Soil Conservation Through Extended Rotations

1988 Activities

During the 1988 growing season a total of 17 research sites were established in connection with this project. Three sites were eliminated through the course of the season due to extreme drought, consequently, 14 sites were maintained and harvested. Where possible, sites were established along major highways or well traveled rural roads to allow for greater visibility. All sites were trimmed, maintained weed free and posted with government and industry signs.

Extension and project promotion played a major role in activities during the summer. A total of 11 sites were viewed, several more than once, through organized tours. Tours were generally arranged by local agricultural representatives, Westco or Pool personnel. Agronomists from Westco or S.W.P. were present on tours to explain the projects objectives, conduct the tour and answer questions. Some tours were organized such that transportation and a luncheon were provided. Strong producer interest in the project was apparent. In total, greater than 400 producers and agriculture professionals were involved in tours.

Promotion of the project has been further enhanced through winter extension meeting. Westco and Pool agronomists have presented project results in producer and professional meetings not only in Saskatchewan but also in Manitoba and Alberta. Total attendance at such meetings has easily exceeded 1000. Aspects of the project have been reported by the Western Producer, The Manitoba Cooperation and several east central Saskatchewan newspapers. In addition, results have recently been highlighted in S.W.P. Product Development's "Production Perspectives", an information fact sheet distributed to 750 Saskatchewan producers, SWP delegates and government/industry professionals. Success of the project is evident by producer participation in tours and meetings as well as request received for further information.

Summary of Growing Season Conditions

During the latter part of April and the first two weeks of May, the project region received well above the normal amounts of precipitation. A local report indicated that for the period April 1 - May 18, 1988 the area had received anywhere from 200-750% of normal precipitation. In contrast to this, most other agricultural regions of Saskatchewan received only 10-50% of normal precipitation for the same period.

The abundant rainfalls which occurred early in the growing season not only resulted in excellent seedbed conditions but also recharged the soil moisture to depths in excess of 60 cm. Seeding of the test sites began on May 17 and was completed by May 23. Emergence at most sites was occurring within one week of planting. Soon after seeding was completed (i.e. May 24-25), all sites received approximately 8-10 mm of rain. This, however, was the last of any significant rainfall until mid July when most locations received about 15 mm of rain. During the first 1 ½ months of growth, crops were completely reliant on subsoil moisture reserves.

June of 1988 was plagued with extremely hot and windy conditions. On several days temperatures exceeded 35 degree celsius and this was often accompanied by moderate winds. This not only hampered spraying operations but it also resulted in rapid depletion of soil moisture reserves. By the end of June, the test sites which were located on lighter textured soils were beginning to show signs of moisture stress. At that time, project leaders decided to abandon three sites due to extremely poor and irregular growth brought on by the unusually dry conditions.

Rain showers, totalling 15-20 mm, which occurred in mid July alleviated the moisture stress somewhat. The crop damage brought on by the intense June heat was, however, irreversible. All barley trials were harvested during the period August 10-15 and the wheat trials were harvested approximately two weeks later.

1988 Results

The following is a summary of the research conducted during the 1988 growing season.

Experiment	# of Sites Established	# of Sites Harvested
Methods of N-P Placement Fall vs Spring	17	13
N-P Rate Study	18	13
Drill-in vs Banded N-P	7	4
Rates of Drill-in Urea and Ammonium Nitrate	5	4
Depth of Bands	7	5
Chloride Ion and Disease	15	11
	69	50

Total number of trials established, representing 7 individual experiments, was 69 located at 17 sites. Three sites were eliminated due to severe heat and moisture stress.

Experiments were established in various randomized complete block designs (experiment dependent) replicated six times. Subplots were 30' x 5', plots were separated by two rows of spring seeded winter wheat. At harvest sites were mechanically combined such that a 80 ft^2 sample was removed. Several trials included a single foliar application of fungicide (Tilt) applied at the recommended rate. On these trials, a 34 ft^2 sample was removed for yield determination.

Soil Sampling

Composite soil samples representative of three depths (0-6", 6-12", 12-24") were collected at each site. Soil samples were forwarded to the Saskatchewan Soil Testing Laboratory for routine analysis. The results obtained are summarized in the Appendix.

Methods of N-P Placement: Fall vs Spring

Information shown in Table 1 is based upon data collected from 11 separate fall and spring trials. Individual site yields and statistical analysis are outlined in the appendix. Results in Table 1 are based upon 4 wheat and 7 barley trials containing fall and spring applied fertilizer treatments.

TABLE 1. Average Yield Response (Based on 11 Trials) to Fall and Spring Applications of Fertilizer

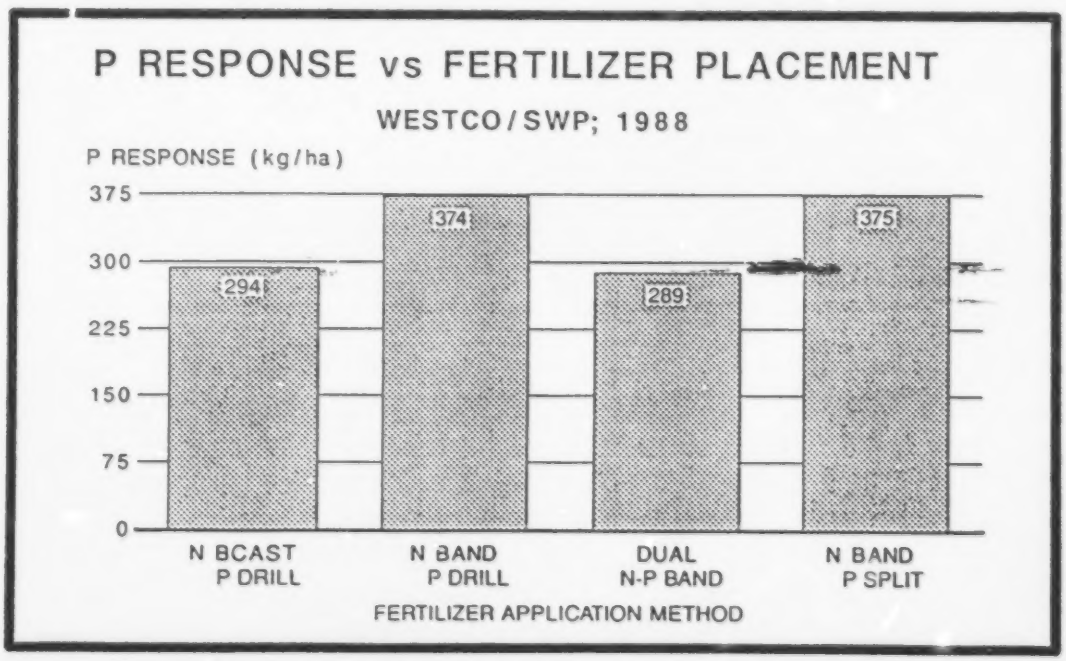
	Grain Yield Increase (kg/ha)		
Treatment	Fall	Spring	Average
N Broadcast	693	738	716
N Band	1076	1094	1085
N Broadcast; P Drill	947	1091	1019
N Band; P Drill	1521	1424	1473
N and P Band	1389	1370	1380
N & 50% P Band; 50% P Drill	1453	1541	1497
N Band; P and K_2O Drill	1381	1499	1440
Average	1209	1251	1230

Rates: N as 46-0-0 at 70 kg N/ha
P as 0-45-0 at 36 kg P_2O_5/ha
K as 0-0-60 at 30 kg K_2O/ha

Check Yield: Fall - 2220 kg/ha
Spring - 2266 kg/ha

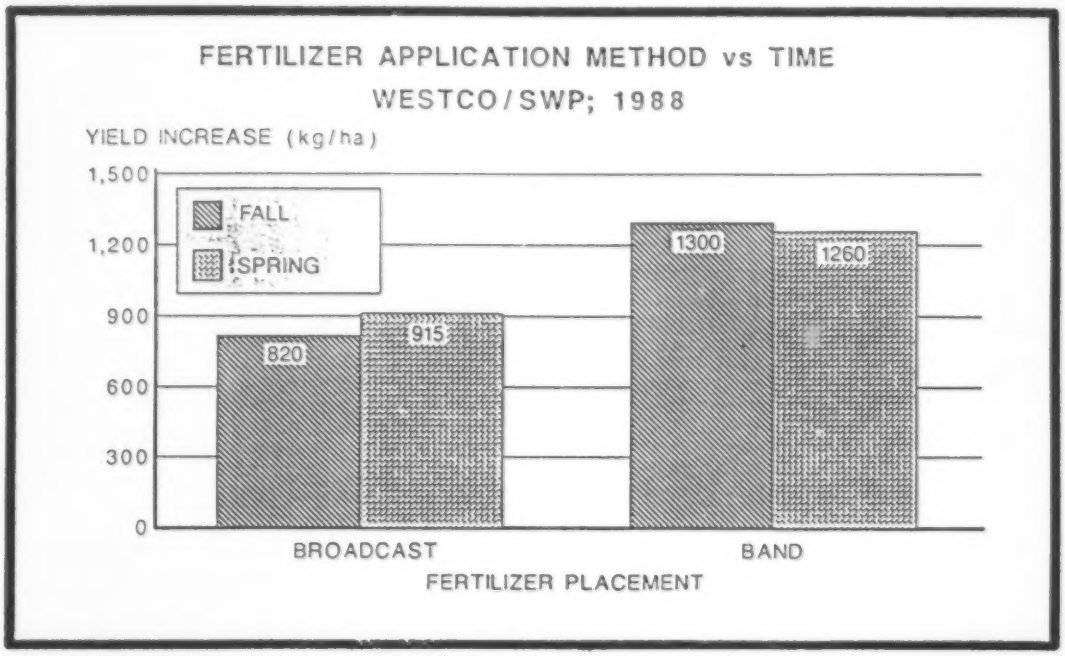
Grain yields were highest when fertilizer was banded as opposed to broadcast. For the two comparable treatments, banding resulted in a 52% and 45% yield advantage over broadcasting based on the yield response to fertilizer. A significant yield difference between comparable band and broadcast treatments occurred at 8 of the 11 trial locations. Yield differences of up to 748 kg/ha (11 bu/ac) between treatments were obtained between treatments. Phosphorus fertilizer additions were beneficial in elevating grain yields by approximately 300 - 400 kg/ha. On average, it appears there was a benefit to applying all or a portion of the phosphorus in the seed row as opposed to banding both phosphorus and nitrogen together, however, average differences were slight (approximately 2 bu/ac). Significant differences between the three band nitrogen treatments where phosphorus placement differed occurred at 4 locations. At two locations splitting the phosphorus application was favored to dual banding, at one location seed place phosphate was higher yielding than the dual band and at one location dual banding was favored to split phosphate application. This is in agreement with results of previous years where very little difference in yield occurred, on average, between methods of phosphorus application but where, at times, one method may have an advantage over another. The average results comparing response to phosphate fertilizer based on the method of phosphate placement is summarized in Figure 1. The lower yield of the dual band placement can be attributed to the wet soil conditions encountered at most sites. Under such conditions placement of some or all the phosphate with the seed is the preferred method of application.

FIGURE 1



On average spring fertilizer applications were 3.5% higher yielding than fall applications. However, differences are apparent as to the effect of time of application when comparing broadcast and band treatments. Spring broadcast treatments were, on average, 11.6% higher yielding than fall broadcast applications. For the two comparable band treatments fall applications exceeded spring applications by 3.2%. As was stated in the 1987 final report it is apparent that yields are influenced less by over winter environmental conditions when fertilizer is banded than when broadcast. Figure 2 demonstrates the effects of method and time of application.

FIGURE 2



The addition of 30 kg K_2O/ha in the seed row was found to have no effect on grain yield.

Two trials were conducted with spring applications only (see appendix). Results from these trials are in agreement with previously stated observations regarding methods of fertilizer applications.

At 5 locations (4 barley, 1 wheat) all treatments were split with an application of fungicide (see appendix). Significant yield responses to fungicide application occurred at all sites. The effect of fungicide application based upon the 5 site average is shown in Table 2.

Table 2. Average Yield Response to Fungicide Application (5 Site Average*)

Treatment	Yield kg/ha -Fungicide	+Fungicide	Average
Check	2344	2491	2417
N Broadcast	3257	3517	3387
N Band	3692	4010	3851
N Broadcast, P Drill	3337	3666	3501
N Band, P Drill	3947	4197	4122
N & P Band	3799	4314	4057
N & 50% P Band, 50% P Drill	3934	4385	4159
N Band, P & K_2O Drill	3925	4295	4110
Average	3529	3872	3701

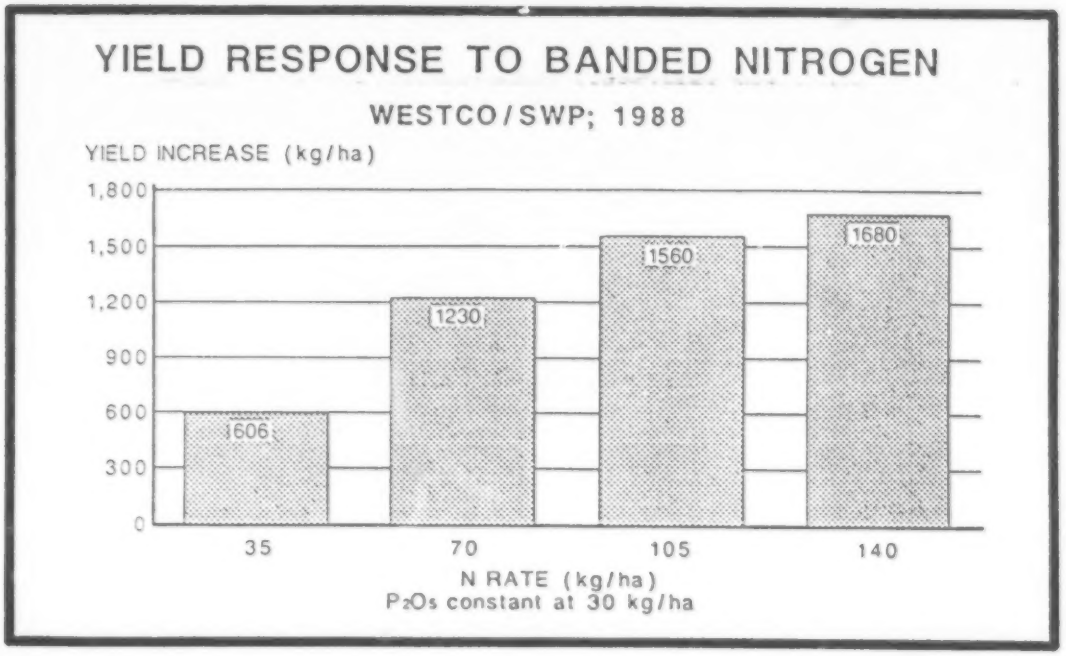
*Combined fall and spring yields.

The application of fungicide increased grain yield of barley by, on average, 304 kg/ha (5.7 bu/ac). At the single wheat trial yields were increased by 501 kg/ha (7.5 bu/ac). Yield increases due to fungicide application followed the order of check< broadcast <band treatments.

Response to Increasing N Rates

The effect of increasing rates of nitrogen was evaluated in 13 trials (9 barley, 4 wheat). All trials, with one exception (8857D), assessed spring fertilizer applications, all nitrogen treatments were evaluated with a standard rate of drill-in phosphate (30 kg P_2O_5/ha). Yield of individual sites and associated statistical analysis are shown in the appendix. All but one site (8862B) responded to at least one increment of supplemental fertilizer nitrogen. The non-responsive site experienced severed heat and moisture stress thereby negating potential responses to fertilizer additions. Seven sites continued to achieve significant yield increases at rates exceeding 70 kg N/ha. The average response to band applied nitrogen is summarized in Figure 3.

FIGURE 3



On average yields continued to increase to 140 kg N/ha, exceeding the check yield (2795 kg/ha) by 60%. A simple economic analysis of results for both crops is shown in Table 3. Results indicate that maximum economic return for barley occurred with the application of 105 kg N/ha (94 lbs N/ac) and for wheat at the 140 kg N/ha rate (125 lbs N/ac).

Table 3. Return to Increasing Rates of N Fertilizer*

Crop	Fertilizer N (lb/ac)	Yield (bu/ac)	Gross Return ($/ac)	Fert. N Cost ($/ac)	Appl. Cost ($/ac)	Net Return ($/ac)	Diff. ($/ac)
	0	61	97.60	-	-	97.60	-
	31	73	116.80	6.82	7.50	102.48	4.88
Barley	62	85	136.00	13.64	7.50	114.86	17.26
	94	92	147.20	20.68	7.50	119.02	21.42
	125	94	150.40	27.50	7.50	115.40	17.80
	0	26	91.00	-	-	91.00	-
	31	33	115.50	6.82	7.50	101.18	10.18
Wheat	62	41	143.50	13.64	7.50	122.36	31.36
	94	45	157.50	20.68	7.50	129.32	38.32
	125	48	168.00	27.50	7.50	133.00	42.00

* Assuming $0.22/lb N, barley = $1.60/bu, wheat = $3.50/bu, application cost includes cost of bander rental, fuel and depreciation.

Nine trials (7 barley, 2 wheat) were evaluated with fungicide applications. According to analysis of variance procedures all but one trial had significant yield responses to the application of fungicide. The mean effect of fungicide application is shown in Table 4. Though all treatments responded to fungicide addition, the yield increases associated to the check treatment were considerably less than those achieved where nitrogen fertilizer was applied. As nitrogen rates increase, disease pressure would increase due to greater vegetative growth and delayed maturity. Under such conditions high nitrogen treatments would be expected to suffer the greatest yield reductions or, alternatively, experience the largest yield increases to foliar fungicide applications.

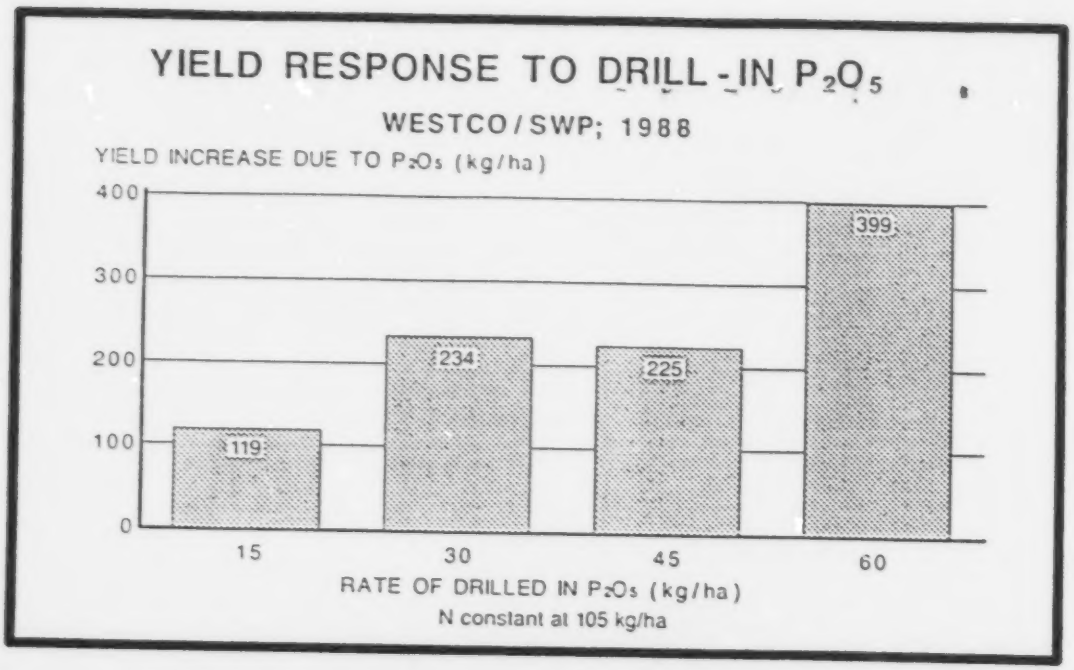
Table 4. Effect of Fungicide and Increasing Rates of Nitrogen (9 Site Average)

	Grain Yield KG/HA		
Treatment	-Fungicide	+Fungicide	Fungicide Response
0-30-0	2942	3150	208
35-30-0	3529	3911	382
70-30-0	4151	4632	481
105-30-0	4590	5010	420
140-30-0	4716	5175	459
Average	3986	4376	390

Response to Increasing P_2O_5 Rates

A total of 13 trials (9 barley, 4 wheat) were conducted to evaluate the effects of increasing increments of phosphate fertilizer. In all cases phosphate fertilizer additions were seed placed, all treatments were evaluated at a standard rate of pre-plant band nitrogen (105 kg N/ha). Individual site results and statistical analyses are outlined in the appendix. Eight trials responded in a positive manner to fertilizer phosphate additions. Mean yield responses to increasing rates of drill in P_2O_5 are shown in Figure 4.

FIGURE 4



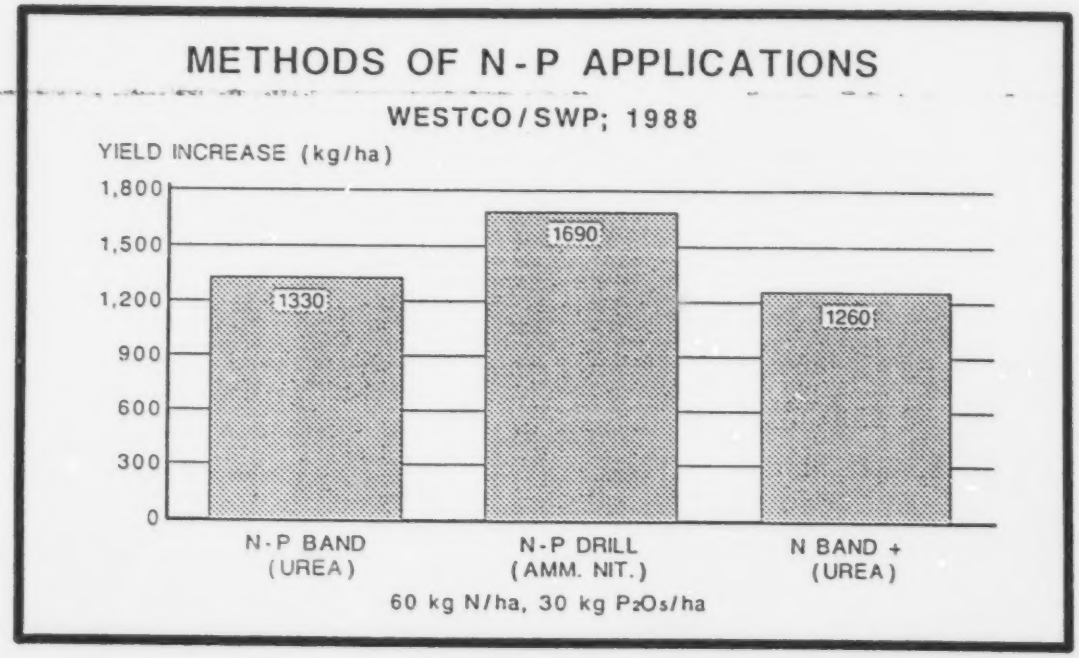
Yield continued to increase to 30 kg P_2O_5/ha level, and then increased again with the addition of 60 kg P_2O_5/ha. The reason for the yield plateau at the 45 kg P_2O_5/ha rate is not readily apparent.

Foliar application of fungicide was evaluated in 9 trials (7 barley, 2 wheat). Analysis of variance procedures indicate that, with the exception of one trial, the fungicide application significantly increased grain yield. The mean effect of fungicide application is shown in Table 5. On average the foliar fungicide application increased grain yield by 10%. Similar trends to those previously mentioned in the nitrogen rate study are applicable with respect to increasing rates of P_2O_5.

Drill-in vs Banded N.P.

Placing fertilizer in the seedrow as an alternative to conducting a separate pre-plant banding operation was evaluated at 4 different sites (3 barley, 1 wheat). Band treatments were conducted in the fall of 1987 at three of the sites. All fertilized treatments received 60 kg N/ha and 30 kg P_2O_5/ha. The source of banded nitrogen was urea, an ammonium nitrate source was utilized in the drill-in treatment. Individual site results and associated statistics are reported in the appendix. Fertilizer addition significantly increased grain yield at all sites. A significant difference in the method of fertilizer application occurred at two sites. At these sites the seed placed ammonium nitrate treatment was superior to both of the urea band treatments. The average yield response to the three methods of fertilizer placement is graphically shown in Figure 5.

FIGURE 5



The highest yield obtained at all sites occurred with seed placed nitrogen. The total amount of ammonium nitrate fertilizer seed placed (60 kg N/ha) significantly exceeds the maximum amount of ammonium nitrate (45 kg N/ha) that is normally suggested as the safe limit for seedrow application. There was, however, excellent subsoil moisture conditions at the time of seeding and trials were conducted on medium to heavy textured soils. Under such conditions there was little noticeable germination damage or seedling thinning observed with the seed placed treatment. Consequently, seed placed ammonium nitrate performed quite favorably and warrants further investigation.

At two locations foliar fungicide application were applied (see appendix). Fungicide treatment resulted in a significant yield increase at both sites. Fertilized treatments responded to fungicide application to a greater degree than did the check treatment. On average, the application of fungicide increased fertilized yields by 404 kg/ha (7.5 bu barley/ac).

Rates of Drill-in Nitrogen

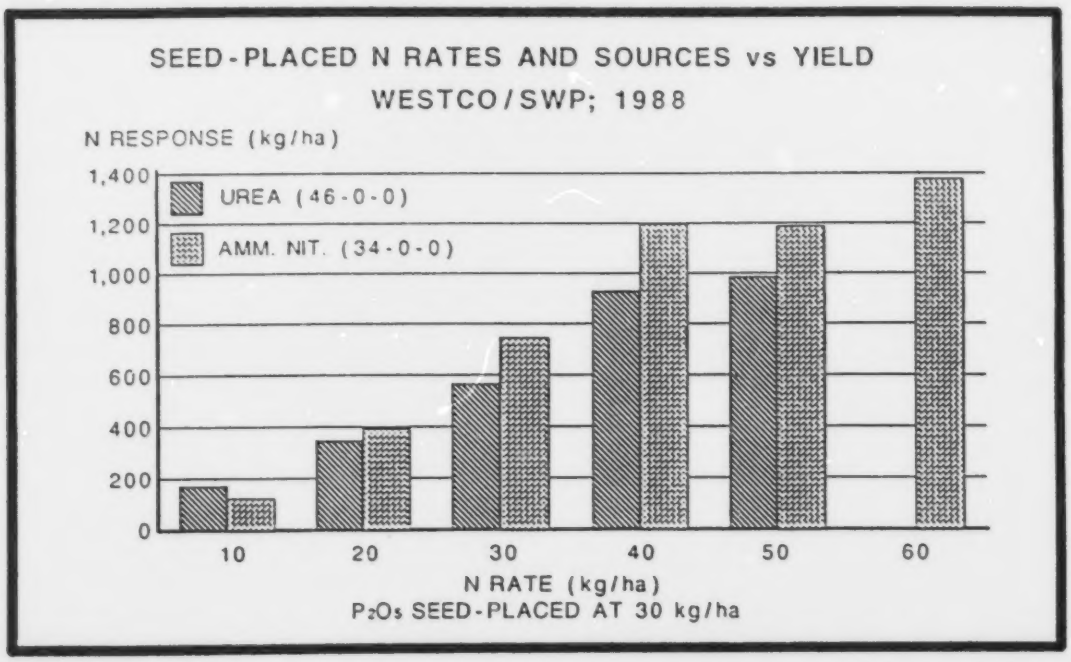
The effect of increasing rates of seed placed nitrogen using two nitrogen fertilizer sources, ammonium nitrate and urea, was evaluated at 4 sites (4 barley). Individual site yields and associated statistical analyses are given in the appendix.

Drill-in nitrogen fertilizer, particularly at high rates, is not a widely adopted practice, none the less, to certain growers the concept is attractive for a number of reasons. Seed placed nitrogen fertilizer may prevent seedbed moisture loss which can occur during spring banding operations, it can be adopted to conservation programs where in tillage operations are reduced. In some cases growers may not have, or be unable to access the necessary banding

equipment, alternatively the practice can be suited to those owning air seeders.

In Saskatchewan present recommendations suggest that no more than 20 kg N/ha as urea-based nitrogen or 45 kg N/ha as ammonium nitrate be seed placed. In this experiment both sources of nitrogen were applied at rates up to 50 kg N/ha, a single treatment of 60 kg N/ha as ammonium nitrate was also included. The effect of increasing rates of the two sources on grain yield is shown in Figure 6.

FIGURE 6



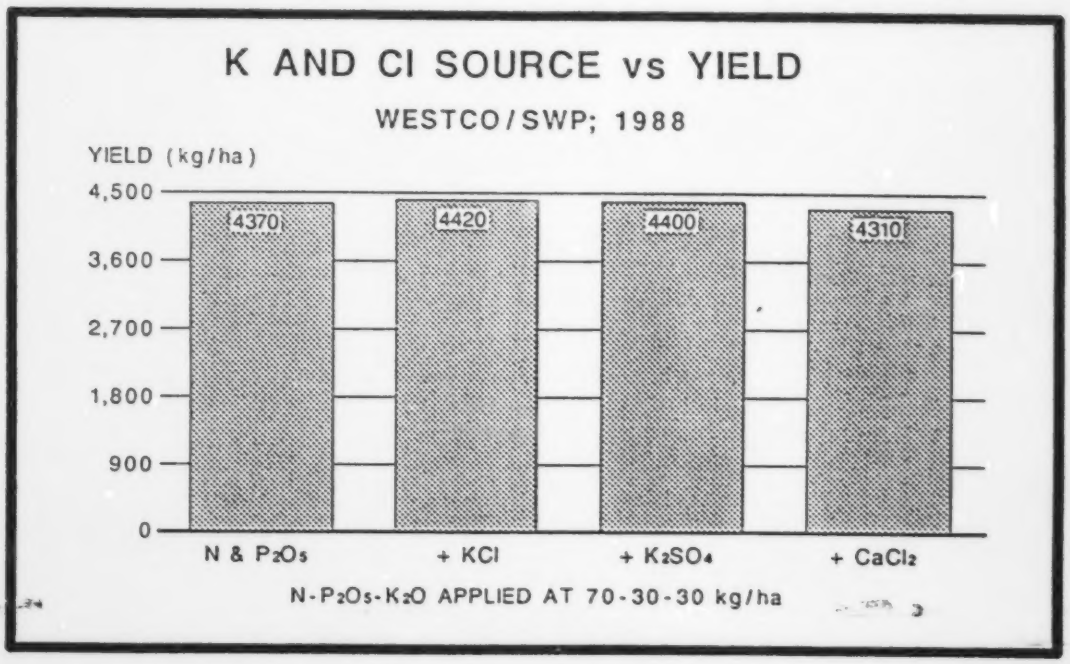
With both nitrogen sources, yield continued to increase as rates increased. It is apparent from Figure 6 that at rates of up to 20 kg N/ha very little difference in yield occurred between fertilizer sources. As fertilizer rates continue to increase, yields of ammonium nitrate treatments exceed those of urea treatments. All trials were conducted on non-saline clay loam soils with favorable seedbed moisture. This may account for the progress increase in yield with both sources. Seedling damage and stand thinning were observed with treatments exceeding 40 kg N/ha particularly in those where urea was applied. Yield was maintained through compensated tillering of thinned treatments. This increase in tillering, however, delayed crop maturity. It appears from Figure 6 that yield of seed placed urea was starting to level at the 50 kg N/ha rate, however, ammonium nitrate continued to increase at the 60 kg N/ha rate. Based upon the data it could be stated that ammonium nitrate is the preferred source when high rates of seed placed nitrogen are attempted.

At three locations a fungicide application was evaluated (see appendix). Foliar fungicide significantly increased grain yield at two sites. The average yield increase achieved to fungicide addition amounted to 289 kg/ha (5.4 bu barley/ac).

Chloride Ion and Disease Study

At 11 different sites (8 barley, 3 wheat) chloride and potassium ion sources of fertilizer were evaluated. Individual site results and associated statistics are reported in the appendix. At no site was there a statistical difference in grain yield to potassium or chloride additions. The effects of fertilizer application are graphically illustrated in Figure 7.

FIGURE 7



Recent Canadian and U.S. studies have reported yield responses to potassium chloride fertilization. It is thought that in some situations the chloride ion can suppress the influence of soil born cereal disease. In these trials the incidence of root disease did not appear to be significant when compared to the foliar disease which were present. Root tissue samples were obtained from each trial for pathological evaluation, however, the results are not available at the time of this reporting. Soil analysis revealed that most sites contained adequate levels of soil chloride.

Five trials were evaluated with a foliar fungicide application (4 barley, 1 wheat). Grain yield was significantly increased by fungicide treatment at all sites (see appendix). In the single wheat trial a fungicide application increased grain yield an average of 569 kg/ha (8.5 bu/ac), the largest barley response accounted for an additional 440 kg/ha (8.2 bu/ac).

Depth of Bands

At 4 sites (3 barley, 1 wheat) the depth of banding (3", 6") in the fall and spring was evaluated, at 1 site (barley) the depth of bands was evaluated [illegible] and accompanying statistics for each site are shown in the appendix. At all sites three methods of fertilization were also evaluated using a standard rate of 70 kg N/ha and 30 kg P_2O_5/ha.

The average check (unfertilized) yields for the 2 depths of bands are summarized in Table 5.

Table 5. Influence of Depth of Banding on Grain Yield of Unfertilized Check Treatment

	Grain Yield Increase (kg/ha)		
Depth	Fall	Spring	Average
3"	2220	2052	2136
6"	1975	2077	2026
Average	2098	2065	2081

Averaging fall and spring treatments suggest that yield was reduced as band depth increased (i.e. tillage effect). However, very little difference was obtained between spring treatments. Spring yields were similar to that obtained for the 6" band treatment. The 4 site average yield for the fall 3" band treatment is somewhat higher than other treatment yields indicated in Table 5. This result may reflect less seedbed moisture loss with this treatment as opposed to a deeper band depth or spring band applications. On average, the tillage effect of the banding operation resulted in slightly lower yield when conducted in the spring as opposed to the fall (33 kg/ha difference in 1988, 26 kg/ha in 1987).

The average response to the 3 methods of fertilization as influenced by depth and time of banding is summarized in Table 6.

Table 6. Influence of Depth and Time of Banding on Grain Yield Response of Fertilized Treatments*

	Grain Yield Increase (kg/ha)		
Depth	Fall	Spring	Average
3"	1456	1512	1484
6"	1752	1641	1697
Average	1604	1576	1591

* Based on average of 3 different fertilizer treatments.

On average, grain yields were higher for the deeper band applications, however, this result was statistically significant at only one site. At this site (wheat) the average 6" depth treatments exceeded the grain yield of shallower treatments by 216 kg/ha (3.2 bu/ac). Time of fertilization had very little effect on grain yield.

Table 7, 8 and 9 summarize the grain yield increases obtained for each of the 3 methods of fertilizer application.

Table 7. Grain Yield Response Due to Time and Depth of N Band

	Grain Yield Increase (kg/ha)		
Depth	Fall	Spring	Average
3"	1327	1389	1358
6"	1604	1486	1545
Average	1466	1438	1452

Table 8. Grain Yield Response Due to Time and Depth of N-P Band

	Grain Yield Increase (kg/ha)		
Depth	Fall	Spring	Average
3"	1554	1602	1578
6"	1849	1776	1813
Average	1702	1689	1696

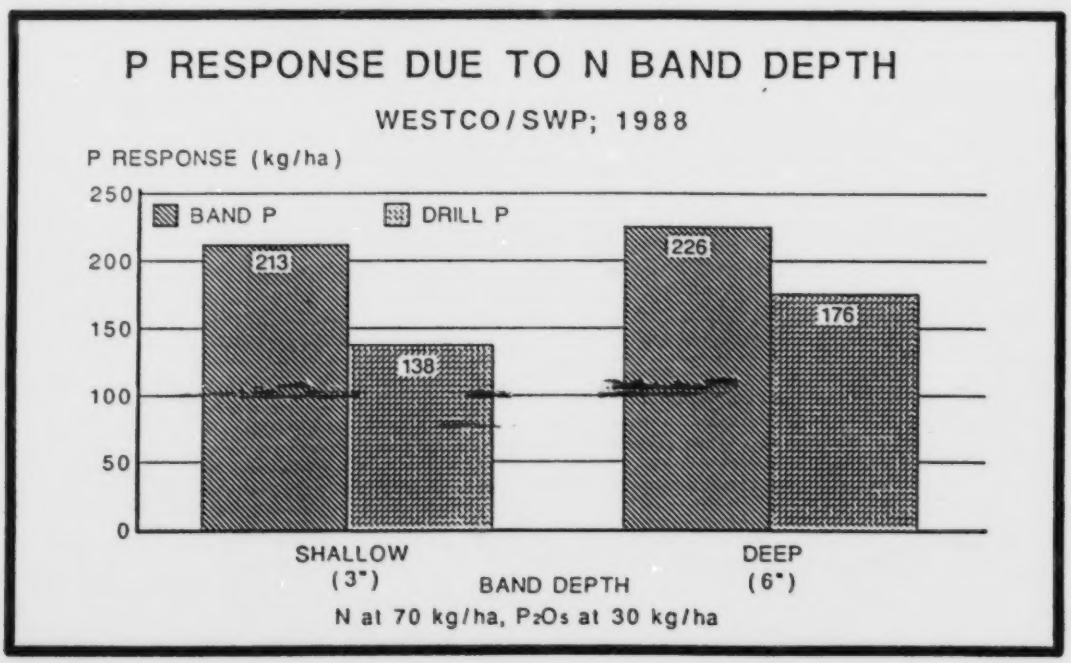
Table 9. Grain Yield Response Due to Time and Depth of N Band; P Drill-In

	Grain Yield Increase (kg/ha)		
Depth	Fall	Spring	Average
3"	1488	1546	1517
6"	1802	1662	1732
Average	1645	1604	1625

In all fertilized treatments increasing the depth of banding from 3" to 6" resulted in increased yields. This suggests that a portion of the fertilizer in the shallow band may have been stranded in dry soil as the growing season progressed.

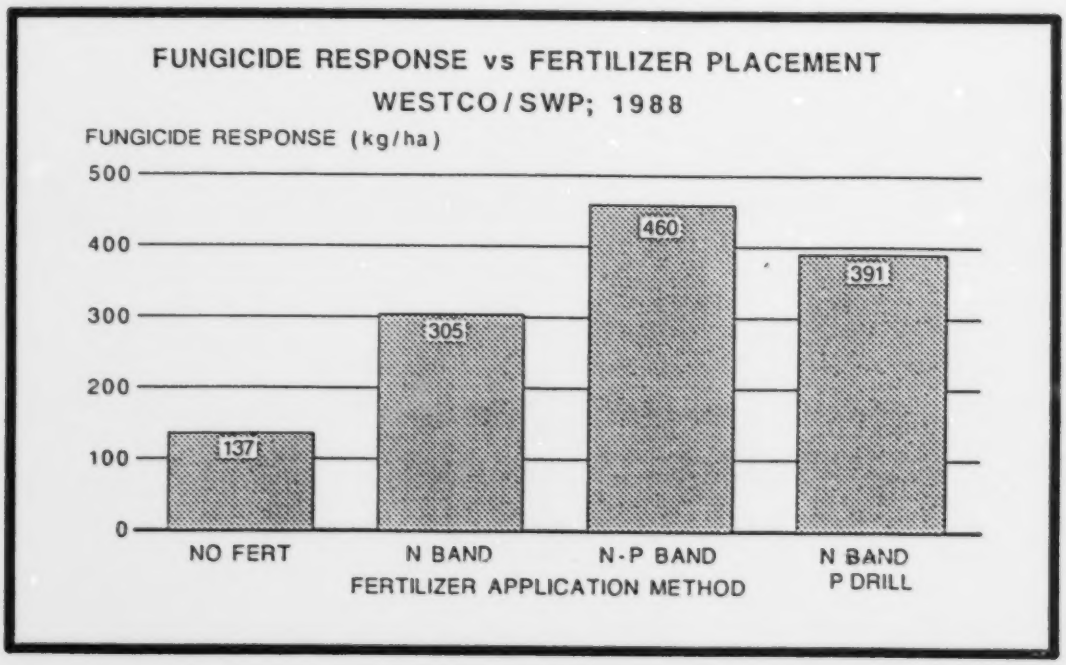
The difference in responses to method of phosphate application and influence of depth is graphically illustrated in Figure 8 (includes 1 spring trial). In these trials banded phosphate was superior to drill-in phosphate at both band depths. That the highest yield occurred with the 6" band phosphate application further adds credence to the possibility of fertilizer unavailability due to subsequent drying of surface soil.

FIGURE 8



Three barley trials were evaluated with a foliar fungicide application. Fungicide treatment resulted in a significant yield increase at two sites. Analysis of variance procedures indicated a significant fungicide * fertilizer method interaction at two sites. Fungicide yield response to the various fertilizer placements is shown in Figure 9. Fertilized treatments, particularly those containing both nitrogen and phosphorus, gained the greatest benefit to foliar fungicide application.

FIGURE 9



SASKATCHEWAN

ERDA PROJECT

APPENDIX

AVERAGE YIELD DATA & STATISTICAL ANALYSES

Soil Test Results as Determined by the Saskatchewan Soil Testing Laboratory

Site	Depth	Texture	pH	Cond.	PPM NO_3-N	P	K	SO_4-S	Cl
8851	0-6"	L	6.7	0.3	6.5	28.0	180	6.5	5.2
	6-12"	L	7.1	0.3	2.0	10.5	70	3.5	1.8
	12-24"	L	7.5	0.3	1.5	6.0	55	4.0	1.5
8853	0-6"	L	7.6	0.4	5.5	7.0	125	5.5	2.6
	6-12"	L	7.9	0.4	1.5	6.0	50	4.0	0.8
	12-24"	CL	7.9	0.8	1.0	4.5	60	12+	0.9
8854	0-6"	L	7.7	0.8	6.5	7.0	90	12+	13.8
	6-12"	L	7.9	1.1	2.0	4.5	60	12+	4.9
	12-24"	CL	8.1	1.1	1.0	4.0	45	12+	3.5
8855	0-6"	L	7.8	0.8	11.5	13.0	170	12+	5.7
	6-12"	L	7.9	1.7	3.0	6.0	65	12+	3.7
	12-24"	CL	7.9	2.5	1.5	5.0	85	12+	1.5
8856	0-6"	L	7.4	0.8	11.0	21.0	120	12+	21.4
	6-12"	L	7.7	1.0	2.0	16.0	70	12+	3.8
	12-24"	CL	7.7	1.2	1.0	16.5	70	12+	5.0
8857	0-6"	L	7.0	0.5	5.5	17.0	185	12+	10.2
	6-12"	CL	7.3	0.5	1.5	12.5	70	12+	3.3
	12-24"	CL	7.7	0.5	1.0	13.0	95	12+	2.9
8858	0-6"	L	7.4	0.5	7.5	13.0	260	8.0	5.4
	6-12"	CL	7.6	0.5	7.0	6.0	160	5.0	1.8
	12-24"	CL	7.7	0.6	2.5	4.0	175	12+	0.8
8859	0-6"	L	7.3	0.3	3.5	10.0	150	4.0	3.0
	6-12"	L	7.5	0.3	4.5	4.5	55	4.0	4.8
	12-24"	L	7.8	0.3	1.0	5.0	55	6.0	3.1
8860	0-6"	L	7.4	0.4	11.5	10.0	95	11.0	5.4
	6-12"	L	7.8	0.4	2.5	6.0	65	4.5	0.4
	12-24"	L	8.0	0.4	1.0	4.0	65	12+	0.2
8862	0-6"	L	7.7	0.4	9.0	7.5	75	6.0	3.1
	6-12"	L	8.0	0.4	4.0	3.5	40	12+	0.8
	12-24"	L	7.9	0.9	7.5	3.5	55	12+	1.6
8863	0-6"	L	7.9	0.3	3.0	7.5	90	6.5	5.0
	6-12"	L	8.1	0.4	1.0	3.5	50	12+	0.6
	12-24"	L	8.1	0.9	1.0	3.5	50	12+	1.2

N - P PLACEMENT TRIAL

YIELD KG/HA

TREATMENT	8851A	8853A	8854A	8855A	8859A
Fall	3374a*	3672a	4121b	4142a	3113a
Spring	3492a	3665a	4242a	4237a	2948a
Check	2251e	2237d	2534e	2831d	2231d
N Broadcast	3223d	3294c	3724d	3757c	2935c
N Band	3649bc	3739b	4369b	4226b	3270b
N Broadcast, P Drill	3256d	3494bc	4071c	3764c	2920c
N Band, P Drill	3779ab	4154a	4537a	4749a	3389ab
N and P Band	3516c	4101a	4942a	4720a	3012c
N & 50% P Band; 50% P Drill	3930a	4205a	4476b	4750a	3448a
N Band, P & K_2O Drill	3857ab	4126a	4797a	4718a	3051c
- Fungicide	3291b	3525b	4075b	3975b	2776b
+ Fungicide	3574a	3813a	4287a	4404a	3281a
C.V.	10.3	12.0	8.9	8.5	9.5
TRT	NS	NS	**	NS	NS
STRT	**	**	**	**	**
SSTRT	**	**	**	**	**
TRT*STRT	NS	NS	NS	NS	NS
TRT*SSTRT	NS	NS	NS	NS	**
STRT*SSTRT	NS	NS	NS	NS	NS
TRT*STRT*SSTRT	NS	NS	NS	NS	NS

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically different at p = 0.05.

N - P PLACEMENT TRIAL (CONT'D)

YIELD KG/HA

TREATMENT	8856A	8857A	8858A	[illegible]	[illegible]
Fall	4010a*	2286b	4698a	3571a	1550a
Spring	4123a	2576a	4994a	3711a	1425b
Check	2488e	1299d	3569d	2852d	1426a
N Broadcast	2800e	2015c	4556c	3385c	1442a
N Band	3208d	2608b	5057abc	3490bc	1421a
N Broadcast, P Drill	4631bc	2120c	4816bc	3766ab	1526a
N Band, P Drill	5049a	2868a	4969abc	4039a	1527a
N and P Band	4536c	2875a	5188ab	3801ab	1521a
N & 50% P Band; 50% P Drill	4892abc	2835a	5478a	3864a	1505a
N Band, P & K_2O Drill	4930ab	2829a	5135abc	3933a	1534a
- Fungicide					
+ Fungicide					
C.V.	10.5	6.0	13.9	10.8	29.8
TRT	NS	**	NS	NS	**
STRT	**	**	**	**	NS
SSTRT					
TRT*STRT	NS	**	NS	NS	NS
TRT*SSTRT					
STRT*SSTRT					
TRT*STRT*SSTRT					

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically different at p = 0.05.

N - P PLACEMENT TRIAL (CONT'D)

YIELD KG/HA

TREATMENT	8863A	8866A	8866A
Fall	1513b*		
Spring	1553a		
Check	954d	3030d	4837
N Broadcast	1415c	3958c	5550d
N Band	1570bc	4072c	5779cd
N Broadcast, P Drill	1515c	4086bc	5910bc
N Band, P Drill	1806a	4319a	6141ab
N and P Band	1633abc	4162abc	6214a
N & 50% P Band; 50% P Drill	1757ab	4125abc	6073ab
N Band, P & K_2O Drill	1605abc	4283ab	6213a
- Fungicide			5650b
+ Fungicide			6017a
C.V.	15.5	3.9	4.9
TRT	**	**	**
STRT	**		**
SSTRT			
TRT*STRT	NS		NS
TRT*SSTRT			
STRT*SSTRT			
TRT*STRT*SSTRT			

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically different at p = 0.05.

N - P PLACEMENT FUNGICIDE TRIALS

YIELD KG/HA

LOCATION - 8851A

	FALL			SPRING			AVERAGE		
TREATMENT	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG
Check	2279	2277	2278	2132	2317	2225	2206	2297	2252
N Broadcast	3107	3344	3226	3079	3362	3221	3093	3353	3223
N Band	3271	3769	3520	3715	3842	3779	3493	3806	3650
N Broadcast, P Drill	2947	3475	3211	3241	3362	3302	3094	3419	3257
N Band, P Drill	3665	3799	3732	3614	4041	3828	3640	3920	3780
N and P Band	3126	3607	3367	3421	3909	3665	3274	3758	3516
N & 50% P Band, 50% P Drill	3803	3974	3889	3848	4096	3972	3826	4035	3931
N Band, P and K_2O Drill	3634	3907	3771	3781	4107	3944	3708	4007	3858
Average	3229	3519	3374	3354	3630	3492	3292	3574	3433

LOCATION - 8853A

	FALL			SPRING			AVERAGE		
TREATMENT	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG
Check	2045	2290	2168	2080	2533	2307	2063	2412	2237
N Broadcast	3262	3387	3325	3301	3226	3264	3282	3307	3294
N Band	3625	3949	3787	3610	3773	3692	3618	3861	3739
N Broadcast, P Drill	3437	3697	3567	3208	3634	3421	3323	3666	3494
N Band, P Drill	3916	4264	4090	3843	4592	4218	3880	4428	4154
N and P Band	3883	4314	4099	3935	4272	4104	3909	4293	4101
N & 50% P Band, 50% P Drill	4055	4475	4265	3853	4437	4145	3954	4456	4205
N Band, P and K_2O Drill	4378	3782	4080	3962	4380	4171	4170	4081	4126
Average	3575	3770	3673	3474	3856	3665	3525	3813	3669

LOCATION - 8854A

	FALL			SPRING			AVERAGE		
TREATMENT	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG
Check	2457	2325	2391	2639	2713	2676	2548	2519	2534
N Broadcast	3629	3816	3723	3585	3866	3726	3607	3841	3724
N Band	4330	4303	4317	4358	4486	4422	4344	4395	4369
N Broadcast, P Drill	3897	3899	3898	4052	4436	4244	3957	4168	4071
N Band, P Drill	4666	4524	4595	4439	4518	4479	4553	4521	4537
N and P Band	4658	5106	4882	4721	5284	5003	4690	5195	4942
N & 50% P Band, 50% P Drill	4279	4581	4430	4239	4805	4522	4259	4693	4476
N Band, P and K_2O Drill	4476	4985	4731	4774	4951	4863	4625	4968	4797
Average	4049	4192	4121	4101	4382	4242	4073	4288	4181

N - P PLACEMENT FUNGICIDE TRIALS (CONT'D)

YIELD KG/HA

LOCATION - 8855A

TREATMENT	FALL			SPRING			AVERAGE		
	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG
Check	2764	2984	2874	2738	3840	2789	2751	2912	2832
N Broadcast	3435	3656	3546	3804	4134	3969	3620	3895	3757
N Band	3973	4311	4142	4098	4521	4310	4036	4416	4226
N Broadcast, P Drill	3415	3649	3532	3786	4206	3996	3601	3928	3764
N Band, P Drill	4583	5005	4794	4514	4896	4705	4549	4951	4750
N and P Band	4419	5123	4771	4316	4995	4656	4368	5059	4713
N & 50% P Band, 50% P Drill	4492	4963	4728	4485	5058	4772	4489	5011	4750
N Band, P and K_2O Drill	4447	5022	4735	4326	5077	4702	4387	5050	4718
Average	3941	4339	4140	4008	4466	4237	3975	4403	4189

LOCATION 8859A

TREATMENT	FALL			SPRING			AVERAGE		
	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG
Check	2145	2224	2185	2154	2400	2277	2150	2312	2231
N Broadcast	2686	3255	2971	2678	3120	2899	2682	3188	2935
N Band	2963	3918	3441	2978	3221	3100	2971	3570	3270
N Broadcast, P Drill	2779	3325	3052	2602	2972	2787	2691	3149	2920
N Band, P Drill	3300	3828	3564	2930	3497	3214	3115	3663	3389
N and P Band	2921	3592	3257	2592	2941	2767	2757	3267	3012
N & 50% P Band, 50% P Drill	3125	3643	3384	3153	3818	3486	3139	3731	3435
N Band, P and K_2O Drill	2636	3466	3051	2832	3270	3051	2734	3368	3051
Average	2819	3406	3113	2740	3155	2948	2780	3281	3030

5 SITE AVERAGE

TREATMENT	FALL			SPRING			AVERAGE		
	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG	- FUNG	+ FUNG	AVG
Check	2338	2420	2379	2349	2561	2455	2344	2491	2417
N Broadcast	3224	3492	3358	3289	3542	3416	3257	3517	3387
N Band	3632	4050	3841	3752	3969	3861	3692	4010	3851
N Broadcast, P Drill	3295	3609	3452	3378	3722	3550	3337	3666	3501
N Band, P Drill	4026	4284	4155	3868	4309	4089	3947	4297	4122
N and P Band	3801	4348	4075	3797	4280	4039	3799	4314	4057
N & 50% P Band, 50% P Drill	3951	4327	4139	3916	4443	4180	3934	4385	4159
N Band, P and K_2O Drill	3914	4232	4073	3935	4357	4146	3925	4295	4110
Average	3523	3845	3684	3536	3898	3717	3529	3872	3701

N RATE STUDY

YIELD KG/HA

Treatment	8851F	8851E	8866C	8866D	8857D
Check	3039d*	2987d	4310c	4049d	1220d
0-30-0	2951d	2796d	4366c	4039d	1249d
35-30-0	3802c	3890c	4982b	4613c	1933c
70-30-0	4532b	4828b	5577a	5124b	2799b
105-30-0	4930ab	5299a	5899a	5712a	3051b
140-30-0	5116a	5215a	5861a	5842a	3419a
C.V.	6.3	4.5	6.0	6.7	10.1

Treatment	8860C	8859C	8859D	8853E	8862B
Check	2893c	2072d	2296d	2531d	1219b
0-30-0	2985bc	2108d	2226d	2543d	1404a
30-30-0	3316b	2747c	2737c	3357c	1392a
70-30-0	3924a	3353b	3567b	3951b	1417a
105-30-0	4099a	3784a	3828ab	4331a	1472a
140-30-0	4083a	3865a	4056a	4541a	1410a
C.V.	8.2	7.1	7.9	5.8	8.9

Treatment	8865E	8855B	8855C	Average	Barley	Wheat
Check	3237c	2989c	3582b	2802	3291	1702
0-30-0	3280c	2939c	3445b	2795	3260	1747
35-30-0	4112b	3898b	3434b	3401	3934	2202
70-30-0	4652a	4478ab	4118ab	4025	4576	2784
105-30-0	4731a	4934a	4482ab	4350	4935	3034
140-30-0	4776a	5023a	4987a	4477	5049	3188
C.V.	5.9	6.8	16.0			

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically significant at p = 0.05.

N-Rate Fungicide

	8851E			8851F		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	2874	3099	2987d	3137	2942	3039d
0-30-0	2857	2735	2796d	3004	2899	2951d
35-30-0	3788	3991	3890c	3818	3785	3802c
70-30-0	4707	4948	4828b	4399	4664	4532b
105-30-0	5202	5395	5299	5024	4836	4930ab
140-30-0	5025	5404	5215a	5204	5028	5116a
Average	4076b	4262a	4169	4098a	4026a	4062
C.V. 4.5	Strt **			C.V. 6.3	Strt NS	
Trt **	Trt * Strt NS			Trt **	Trt * Strt NS	

	8859C			8859D		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	1971	2173	2072d	2031	2560	2296d
0-30-0	1926	2289	2108d	2072	2381	2226d
35-30-0	2483	3011	2747c	2532	2942	2737c
70-30-0	3016	3691	3353b	3139	3994	3567b
105-30-0	3391	4177	3784a	3540	4117	3828ab
140-30-0	3416	4314	3865a	3698	4414	4056a
Average	2700b	3276a	2988	2835b	3401a	3118
C.V. 7.1	Strt **			C.V. 7.9	Strt **	
Trt **	Trt * Strt NS			Trt **	Trt * Strt NS	

N-Rate Fungicide Trial

	8866C			8866D		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	4295	4325	4310c	3943	4154	4049d
0-30-0	4316	4416	4366c	3904	4175	4039d
35-30-0	4782	5223	4982b	4367	4859	4613c
70-30-0	5324	5829	5577a	4946	5301	5124b
105-30-0	5646	6152	5899a	5291	6132	5712a
140-30-0	5756	5949	5861a	5498	6186	5842a
Average	5020b	5316a	5166	4658b	5135a	4897
C.V. 5.8	Strt **			C.V. 6.0	Strt **	
Trt **	Trt * Strt NS			Trt **	Trt * Strt NS	

	8855B			8855C		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	2800	3178	2989c	3497	3667	3582b
0-30-0	2693	3185	2939c	3300	3589	3445b
35-30-0	3685	4111	3898b	3240	3628	3434b
70-30-0	4131	4828	4478ab	3996	4240	4118ab
105-30-0	4778	5091	4934a	4330	4634	4482a
140-30-0	4912	5135	5023a	4525	5469	4997a
Average	3833b	4254a	4044	3815b	4204a	4010
C.V. 6.8	Strt **			C.V. 16.0	Strt **	
Trt **	Trt * Strt NS			Trt **	Trt * Strt NS	

N-Rate Fungicide

	8853E			[illegible] Strt Average		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	2309	2753	2531d	2984	3206	3095
0-30-0	2402	2684	2543	2942	3150	3046
35-30-0	3062	3652	3357c	3529	3911	3718
7030-0	3702	4201	3951b	4151	4632	4392
105-30-0	4110	4552	4331a	4590	5010	4800
140-30-0	4407	4676	4541a	4716	5175	4946
Average	3332b	3753a	3542	3819	4181	4000

C.V. 5.8 Strt **
Trt ** Trt * Strt NS

P RATE STUDY

YIELD KG/HA

Treatment	8851F	8851E	8866C	8866D	8857D
Check	3039b*	2987c	4310c	4049c	1220c
105-0-0	4861a	4898b	4895bc	5368b	2918b
105-15-0	5068a	5149ab	5302ab	5407b	2961b
105-30-0	4930a	5299a	5899a	5712ab	3051b
105-45-0	5023a	4880b	5503b	5565ab	3344a
105-60-0	5055a	4951ab	5465ab	5910a	3351a
C.V.	5.3	6.4	6.3	6.7	8.2

Treatment	8860C	8859C	8859D	8853E	8862B
Check	2893c	2072b	2296b	2531e	1219c
105-0-0	3472b	3580a	3763a	3854d	1261bc
105-15-0	3564b	3732a	3919a	4204c	1273bc
105-30-0	4099a	3784a	3828a	4331bc	1472a
105-45-0	4174a	3677a	3639a	4545ab	1345abc
105-60-0	4480a	3673a	4001a	4693a	1419ab
C.V.	8.2	5.2	6.1	4.8	9.9

Treatment	8865E	8855B	8855C	Average	Barley	Wheat
Check	3237d	2989b	3582b	2802	3291	1702
105-0-0	4540c	4846a	5253a	4116	4665	2881
105-15-0	4601bc	5054a	4821a	4235	4797	2971
105-30-0	4731abc	4934a	4482ab	4350	4935	3034
105-45-0	4875ab	4992a	4866a	4341	4936	3001
105-60-0	4905a	5335a	5461a	4515	5139	3111
C.V.	5.3	5.9	12.6			

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically significant at p = 0.05.

P-Rate Fungicide Trials

	8851E			8851F		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	2874	3099	2987c	3137	2942	3039b
105-0-0	4789	5008	4898b	4889	4833	4861a
105-15-0	4933	5365	5149ab	5065	5071	5068a
105-30-0	5202	5395	5299a	5024	4836	4930a
105-45-0	4631	5128	4880b	4954	5091	5023a
105-60-0	4923	4978	4951ab	4953	5157	5055a
Average	4559b	4829a	4694	4670a	4655a	4663
C.V. 6.4	Strt **			C.V. 5.3	Strt NS	
Trt **	Trt * Strt NS			Trt **	Trt * Strt NS	

	8859C			8859D		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	1971	2173	2072b	2031	2560	2296b
105-0-0	3262	3897	3580a	3489	4036	3763a
105-15-0	3388	4076	3732a	3505	4333	3919a
105-30-0	3391	4177	3784a	3540	4117	3828a
105-45-0	3244	4110	3677a	3316	3961	3639a
105-60-0	3300	4046	3673a	3707	4194	4001a
Average	3093b	3747a	3420	3265b	3884a	3575
C.V. 5.2	Strt **			C.V. 6.1	Strt **	
Trt **	Trt * Strt **			Trt **	Trt * Strt NS	

P-Rate Fungicide Trials

	8866C			8866D		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	4295	4325	4310c	3943	4154	4049c
105-0-0	4666	5123	4895bc	5151	5585	5368b
105-15-0	4976	5627	5302ab	5218	5596	5407b
105-30-0	5646	6152	5899a	5291	6132	5712ab
105-45-0	5280	5725	5503ab	5041	6089	5565ab
105-60-0	5363	5566	5465ab	5696	6125	5910a
Average	5038b	5420a	5229	5057b	5613a	5335
C.V. 6.3	Strt **			C.V. 6.7	Strt **	
Trt **	Trt * Strt NS			Trt **	Trt * Strt NS	

	8855B			8855C		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	2800	3178	2989B	3497	3667	3582b
105-0-0	4618	5073	4846a	5054	5456	5255a
105-15-0	4674	5433	5054a	4640	5002	4821a
105-30-0	4778	5091	4934a	4330	4634	4482ab
105-45-0	4795	5189	4992a	4475	5256	4866a
105-60-0	5062	5607	5335a	5396	5527	5461a
Average	4455b	4929a	4692	4565b	4924a	4745
C.V. 5.9	Strt **			C.V. 12.6	Strt **	
Trt **	Trt * Strt NS			Trt **	Trt * Strt NS	

P-Rate Fungicide Trials

	[illegible]8853E			[illegible]9 Site Average		
Treatment	-Fung	+Fung	Average	-Fung	+Fung	Average
Check	2309	2753	2531a	2984	3206	3095
105-0-0	3647	4062	3854d	4396	4786	4591
105-15-0	3816	4593	4204c	4468	5011	4740
105-30-0	4110	4552	4331bc	4590	5010	4800
105-45-0	4271	4820	4545ab	4445	5041	4743
105-60-0	4432	4954	4693a	4759	5139	4949
Average	3764b	4289a	4026	4274	4699	4487

C.V. 4.8 Strt **
Trt ** Trt * Strt NS

N - P BAND VS DRILL-IN

YIELD KG/HA

TREATMENT	8851D	8853D	8857C	8865D	AVERAGE
Check	3036b*	2343b	1301c	3135c	2454
N - P Band (46-0-0)	4208a	4112a	2561b	4244b	3781
N - P Drill-In (26-13-0)	4300a	4222a	3235a	4818a	4144
N Band, P Drill-In (46-0-0)	3919a	3959a	2631b	4346b	3714
C.V.	7.7	5.6	4.3	6.5	

N - P BAND VS DRILL-IN

FUNGICIDE TRIALS

YIELD KG/HA

	8851D		8853D		AVERAGE	
TREATMENT	- FUNG	+ FUNG	- FUNG	+ FUNG	- FUNG	+ FUNG
Check	2908	3165	2249	2437	2579	2801
N - P Band (46-0-0)	4014	4402	3898	4327	3956	4365
N - P Drill-In (26-13-0)	3967	4632	4182	4261	4075	4447
N Band, P Drill-In (46-0-0)	3744	4094	3702	4216	3723	4155
Average	3658b	4073a	3508b	3810a	3583	3942
C.V.	7.7		5.6			
TRT	**		**			
STRT	**		**			
TRT*STRT	NS		NS			

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically significant at p = 0.05.

RATES OF DRILL-IN NITROGEN

YIELD KG/HA

TREATMENT	8858C	8853F	8854D	8866E	AVERAGE
Check	5133abc*	2692f	2353f	4904e	3771
10 A.N.	4545c	3056def	2695ef	5285cd	3895
10 Urea	5166abc	2888ef	2667ef	5055de	3944
20 A.N.	5122abc	3207cde	2972de	5360cd	4165
20 Urea	4804bc	3421cd	2935de	5327cd	4122
30 A.N.	5305abc	3588bc	3606bc	5571abc	4518
30 Urea	5095abc	3580bc	3335cd	5456bc	4367
40 A.N.	5456abc	4033ab	3818b	5852a	4790
40 Urea	5640ab	3908b	3739bc	5530abc	4704
50 A.N.	5745ab	4059ab	4245a	5792ab	4960
50 Urea	5482abc	3995ab	4271a	5291cd	4760
60 A.N.	6015a	4409a	4358a	5816ab	5150
C.V.	14.1	10.2	7.9	7.8	
TRT	NS	**	**	**	
STRT		**	NS	**	
TRT*STRT		NS	NS	NS	

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically significant at p = 0.05.

RATES OF DRILL-IN NITROGEN

YIELD KG/HA

	8853F		8854D	
TREATMENT	- FUNGICIDE	+ FUNGICIDE	- FUNGICIDE	+ FUNGICIDE
Check	2405	2979	2372	2334
10 A.N.	2849	3263	2714	2677
10 Urea	2832	2944	2644	2689
20 A.N.	2980	3434	2907	3038
20 Urea	3200	3641	2977	2894
30 A.N.	3620	3555	3549	3662
30 Urea	3369	3792	3413	3256
40 A.N.	3883	4183	3771	3865
40 Urea	3741	4075	3649	3828
50 A.N.	3840	4279	4151	4339
50 Urea	3762	4228	4198	4344
60 A.N.	4324	4494	4340	4376
Average	3400b*	3739a	3390a	3442a
C.V.	10.2		7.9	
TRT	**		**	
STRT	**		NS	
TRT*STRT	NS		NS	

	8866E		AVERAGE	
TREATMENT	- FUNGICIDE	+ FUNGICIDE	- FUNGICIDE	+ FUNGICIDE
Check	4851	4956	3209	3423
10 A.N.	5077	5493	3547	3811
10 Urea	4841	5268	3439	3634
20 A.N.	4995	5725	3627	4066
20 Urea	5122	5532	3766	4022
30 A.N.	5227	5916	4132	4378
30 Urea	5365	5546	4049	4198
40 A.N.	5520	6185	4391	4744
40 Urea	5374	5686	4255	4530
50 A.N.	5538	6046	4510	4888
50 Urea	5117	5466	4359	4679
60 A.N.	5352	6281	4672	5050
Average	5198b	5675a	3996	4285
C.V.	7.8			
TRT	**			
STRT	**			
TRT*STRT	NS			

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically significant at p = 0.05.

CHLORIDE ION AND DISEASE TRIALS

YIELD KG/HA

Treatment	8851C	8853C	8854C	8856B	8857B
N Band,P Drill-In	4125a*	4346b	4470a	5284a	2941a
N Band,P & KCl Drill-In	4333a	4491ab	4394a	5414a	2878a
N Band,P & K_2SO_4 Drill-In	4251a	4524a	4326a	5354a	2892a
N Band,P & $CaCl_2$ Drill-In	4285a	4616a	4304a	5274a	2952a
C.V.	4.5	2.8	3.0	6.1	3.0

Treatment	8858B	8859B	8860B	8863C	8865C
N Band,P Drill-In	5696a	3668a	4480ab	2209a	4517a
N Band,P & KCl Drill-In	5394a	3839a	4796a	2058a	4581a
N Band,P & K_2SO_4 Drill-In	5404a	3704a	4765a	2156a	4571a
N Band,P & $CaCl_2$ Drill-In	5434a	3677a	4025b	2014a	4480a
C.V.	7.6	7.5	10.0	10.1	3.2

Treatment	8866B	Average
N Band,P Drill-In	6299a	4367
N Band,P & KCl Drill-In	6462a	4422
N Band,P & K_2SO_4 Drill-In	6430a	4398
N Band,P & $CaCl_2$ Drill-In	6384a	4313
C.V.	6.2	

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically significant at p = 0.05.

CHLORIDE ION AND DISEASE TRIALS

FUNGICIDE APPLICATIONS

	LOCATION 8851C (YIELD KG/HA)		8853C	
TREATMENT	- FUNGICIDE	+ FUNGICIDE	- FUNGICIDE	+FUNGICIDE
N Band, P Drill-In	4060	4190	4222	4471
N Band, P & KCl Drill-In	4170	4496	4399	4583
N Band, P & K_2SO_4 Drill-In	4235	4267	4399	4649
N Band, P & $CaCl_2$ Drill-In	4145	4425	4447	4785
Average	4152b*	4344a	4367b	4622a
C.V.	4.5		2.8	
TRT	NS		**	
STRT	**		**	
TRT*STRT	NS		NS	

	LOCATION 8854C (YIELD KG/HA)		8859B	
TREATMENT	- FUNGICIDE	+ FUNGICIDE	- FUNGICIDE	+FUNGICIDE
N Band, P Drill-In	4391	4548	3376	3960
N Band, P & KCl Drill-In	4260	4528	3549	4129
N Band, P & K_2SO_4 Drill-In	4299	4352	3430	3979
N Band, P & $CaCl_2$ Drill-In	4318	4290	3395	3960
Average	4317b	4430a	3438b	4007a
C.V.	3.0		7.5	
TRT	NS		NS	
STRT	**		**	
TRT*STRT	NS		NS	

	LOCATION 8866B (YIELD KG/HA)		AVERAGE	
TREATMENT	- FUNGICIDE	+ FUNGICIDE	- FUNGICIDE	+FUNGICIDE
N Band, P Drill-In	5966	6632	4403	4760
N Band, P & KCl Drill-In	6202	6722	4516	4892
N Band, P & K_2SO_4 Drill-In	6218	6641	4516	4778
N Band, P & $CaCl_2$ Drill-In	6308	6460	4523	4784
Average	6174b	6614a	4490	4804
C.V.	6.2			
TRT	NS			
STRT	**			
TRT * STRT	NS			

* According to Duncan's Multiple Range Test, numbers followed by the same letter are not statistically significant at p = 0.05.

EXPERIMENT #: 88548
TITLE: DEPTH OF BANDS - FALL vs SPRING; FUNGICIDE SPLIT
YEAR: 1988
CROP: HEARTLAND BARLEY
COOPERATOR: JOHN DYSTRYK
CANORA, SASKATCHEWAN

SUMMARY OF GRAIN YIELDS (bu/ac)

FALL APPLIED FERTILIZER

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2727.3	2984.9	2856.1	2297.3	2530.7	2414.0	2512.3	2757.8	2635.1
N BAND	4216.1	4741.8	4478.9	4400.6	4889.5	4645.1	4308.4	4815.7	4562.0
N + P BAND	4441.1	5154.5	4797.8	4861.1	5433.6	5147.4	4651.1	5294.0	4972.6
N BAND, P DRILL-IN	4356.5	5045.7	4701.1	4724.4	5273.8	4999.1	4540.5	5159.7	4850.1
AVERAGE	3935.2	4481.7	4208.5	4070.9	4531.9	4301.4	4003.1	4506.8	4254.9

SPRING APPLIED FERTILIZER

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2563.3	2705.2	2634.3	2820.4	2588.5	2704.5	2691.8	2646.9	2669.4
N BAND	4598.3	4887.9	4743.1	4187.2	5165.0	4676.1	4392.7	5026.5	4709.6
N + P BAND	4727.1	5350.6	5038.8	4662.4	5111.9	4887.2	4694.7	5231.2	4963.0
N BAND, P DRILL-IN	4514.2	4788.1	4651.1	4737.6	5026.7	4882.2	4625.9	4907.4	4766.6
AVERAGE	4100.7	4432.9	4266.8	4101.9	4473.0	4287.5	4101.3	4453.0	4277.1

FALL AND SPRING COMBINED

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2645.3	2845.1	2745.2	2558.8	2559.6	2559.2	2602.1	2702.4	2652.2
N BAND	4407.2	4814.9	4611.0	4293.9	5027.3	4660.6	4350.5	4921.1	4635.8
N + P BAND	4584.1	5252.5	4918.3	4761.8	5272.8	5017.3	4672.9	5262.6	4967.8
N BAND, P DRILL-IN	4435.3	4916.9	4676.1	4731.0	5150.3	4940.6	4583.2	5033.6	4808.4
AVERAGE	4018.0	4457.3	4237.7	4086.4	4502.5	4294.4	4052.2	4479.9	4266.0

FERTILIZER RATES AND SOURCES

N - Urea applied at 63 lb/ac
P205 - 0-45-0 applied at 27 lb/ac

SHALLOW - 2-3"
DEEP - 6-7"

EXPERIMENT #: 68538
TITLE: DEPTH OF BANDS - FALL vs SPRING; FUNGICIDE SPLIT
YEAR: 1988
CROP: HARRINGTON BARLEY
COOPERATOR: KEN BLOUDOFF
VEREGIN, SASKATCHEWAN

SUMMARY OF GRAIN YIELDS (bu/ac)

FALL APPLIED FERTILIZER

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2388.8	2510.7	2449.8	2047.1	2110.7	2078.9	2217.9	2310.7	2264.3
N BAND	3480.6	3732.5	3606.6	3475.4	3817.6	3646.5	3478.0	3775.0	3626.5
N + P BAND	3676.7	4091.0	3883.9	3734.6	4094.7	3914.6	3705.6	4092.8	3899.2
N BAND, P DRILL-IN	3708.8	4128.3	3918.6	3780.3	4307.6	4043.9	3744.5	4217.9	3981.2
AVERAGE	3313.7	3615.6	3464.7	3259.3	3582.6	3421.0	3286.5	3599.1	3442.8

SPRING APPLIED FERTILIZER

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2107.0	2256.3	2181.6	1985.6	2289.9	2137.8	2046.3	2273.1	2159.7
N BAND	3272.5	3717.7	3495.1	3312.4	3751.9	3532.2	3292.4	3734.8	3513.6
N + P BAND	3370.3	4204.0	3787.1	3661.5	4523.6	4092.6	3515.9	4363.8	3939.8
N BAND, P DRILL-IN	3471.7	4299.7	3885.7	3748.2	4458.4	4103.3	3610.0	4379.1	3994.5
AVERAGE	3055.4	3619.4	3337.4	3176.9	3756.0	3466.5	3116.1	3687.7	3401.9

FALL AND SPRING COMBINED

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2247.9	2383.5	2315.7	2016.3	2200.3	2108.3	2132.1	2291.9	2212.0
N BAND	3376.6	3725.1	3550.8	3393.9	3784.8	3589.3	3385.2	3754.9	3570.1
N + P BAND	3523.5	4147.5	3835.5	3698.0	4309.1	4003.6	3610.8	4228.3	3919.5
N BAND, P DRILL-IN	3590.3	4214.0	3902.1	3764.3	4383.0	4073.6	3677.3	4298.5	3987.9
AVERAGE	3184.5	3617.5	3401.0	3218.1	3669.3	3443.7	3201.3	3643.4	3422.4

FERTILIZER RATES AND SOURCES

N - Urea applied at 63 lb/ac
P2O5 - 0-45-0 applied at 27 lb/ac

SHALLOW - 2-3"
DEEP - 6-7"

EXPERIMENT #: 88513
TITLE: DEPTH OF BANDS - FALL vs SPRING; FUNGICIDE SPLIT
YEAR: 1988
CROP: BONANZA BARLEY
COOPERATOR: JIM McDOUGAL
YORKTON, SASKATCHEWAN

SUMMARY OF GRAIN YIELDS (bu/ac)

FALL APPLIED FERTILIZER

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2410	2848	2629	2307	2336	2321	2358	2592	2475
N BAND	4248	4525	4386	4451	3975	4213	4349	4250	4300
N + P BAND	4476	4610	4543	4083	4334	4208	4280	4472	4376
N BAND, P DRILL-IN	4298	4427	4363	4217	4154	4185	4257	4291	4274
AVERAGE	3858	4103	3980	3764	3700	3732	3811	3901	3856

SPRING APPLIED FERTILIZER

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2292	2577	2435	2493	2341	2417	2392	2459	2426
N BAND	4003	4154	4078	4150	4096	4123	4076	4125	4101
N + P BAND	4058	4236	4147	4251	4382	4317	4155	4309	4232
N BAND, P DRILL-IN	4047	4291	4169	4001	4093	4047	4024	4192	4108
AVERAGE	3600	3814	3707	3724	3728	3726	3662	3771	3717

FALL AND SPRING COMBINED

TREATMENT	SHALLOW BAND - FUNG	SHALLOW BAND + FUNG	SHALLOW BAND AVG	DEEP BAND - FUNG	DEEP BAND + FUNG	DEEP BAND AVG	AVERAGE - FUNG	AVERAGE + FUNG	AVERAGE AVG
NO FERTILIZER	2351	2713	2532	2400	2339	2369	2375	2526	2450
N BAND	4125	4339	4232	4300	4036	4168	4213	4187	4200
N + P BAND	4267	4423	4345	4167	4358	4263	4217	4390	4304
N BAND, P DRILL-IN	4173	4359	4266	4109	4123	4116	4141	4241	4191
AVERAGE	3729	3959	3844	3744	3714	3729	3737	3836	3786

FERTILIZER RATES AND SOURCES

N - Urea applied at 63 lb/ac
P2O5 - 0-45-0 applied at 27 lb/ac

SHALLOW - 2-3"
DEEP - 6-7"